

INVENTOR: McBride et al  
TITLE: MEDICAL TESTING AND METHOD

attorney docket: CARDIOBEAT-1

**EXHIBIT 9**

**CARDIOBEAT COMMUNICATIONS PROTOCOL****PRELIMINARY****WLW - 2/9/00****REV1 - 2/21/00**

Communication between the Impedance Measurement Unit and the Host is via a full duplex RS232 connection at 38.4 Kilobaud. Measurement data are sent to the Host as byte pairs, MSB followed by LSB. The MSN (Most Significant Nibble) of the 8 bit A/D data is sent as the lower four bits of the MSB. The LSN of the 8 bit A/D data is sent as the lower four bits of the LSB. Each byte pair conveys the following information:

1. The Byte ID (LSB or MSB) (b4 = 0 for LSB, b4=1 for MSB).
2. The A/D channel number ( 0 - 3 ) of the data contained in this pair (b7 and b6 of the MSB)
3. The A/D data MSN or LSN (b3 - b0).
4. Calibrate/Normal mode. (LSB b6 = 1 in calibrate mode)
5. Note that b5 is always 1 in both MSB and LSB. This insures that no data byte will be an ASCII control character.

MSB Contents	b7 CH MSb	b6 CH LSB	b5 1	b4 1	b3,b2,b1,b0 A/D MSN
LSB Contents	b7 spare	b6 MODE	b5 1	b4 0	b3,b2,b1,b0 A/D LSN

The channel identification is as follows:

CH0 - ECG

CH1 - dz/dt

CH2 - DZ

CH3 - Z0

Each channel is sampled and its data transmitted in turn so that 8 sequential bytes represent one sample of each of the 4 channels.

Using this protocol, up to 480 data points per second per channel may be transmitted at 38.4 Kbaud. (10 bits x 2 bytes x 4 channels x 480/scc). The actual data rate will be approximately 400 data points per second per channel.